

*By the Editor of the Review
with Dr. Dobie's compliments*

272 ON 9

THE USE OF CHLORINE

IN THE TREATMENT OF

ASIATIC CHOLERA

AND

CHOLERAIC DIARRHŒA.

BY

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THE USE OF CHLORINE IN ASIATIC CHOLERA.

CHOLERA made its appearance in Chester early in the month of September last year. One of its earliest victims was the late Alderman Trevor, who had recently held the office of Mayor of this city for two successive years. It was not, however, till near the end of the month that cholera cases became frequent, and the municipal authorities found it necessary to open a small hospital for their reception, in the park recently presented to the city by the Marquess of Westminster. Three ladies, resident in the city, undertook the nursing of the patients, and remained in the hospital, working day and night, during the two months in which the epidemic prevailed. The hospital was finally closed on the 25th of November, though a few sporadic cases were afterwards reported, and one unmistakable case was seen and treated by myself as late as the 12th of January of this year. The exact number of cases of cholera which occurred in Chester I am unable to ascertain, but I have reason to believe that there were at least 130.

The object in this communication is, not so much to give an account of the epidemic as it occurred in Chester, as to describe the general result of the trial of chlorine as a remedy; having seen no account in any of the medical journals of its internal use in Asiatic cholera.

At the commencement of the visitation, the cases were of a very malignant type. Premonitory diarrhoea was often absent, and the patient passed into a state of collapse after a couple of hours of violent vomiting and purging: death took place in from ten to twenty hours. The first six cases died; they were treated in different ways: some with calomel and small doses of opium, others with mineral acids, etc.

Feeling disheartened by the results of ordinary methods of treatment, and remembering that my friend, Mr Moreton, of Tarvin, had told me that in a sporadic case of Asiatic cholera, occurring in his district, he had used chlorine water with apparently very good effects, I determined to make a trial of it. Though the first patient on whom it was tried died, the improvement observed following its use induced me to administer it in other cases.

Encouraged by the results of further trials, I asked Mr Brittain, the senior surgeon to the Chester Infirmary, to make a trial of chlorine at the cholera hospital, of which he had the sole charge. He most kindly acceded to the request, and further allowed me to pay a daily visit to the hospital. I was thus enabled to form a more correct and satisfactory opinion as to the usefulness of the medicine.

As was to be expected, the results in the cholera hospital were

more satisfactory than in the cases treated in the town. In the hospital the air was pure, the nursing perfect, and every possible remedial appliance was brought to the aid of the sufferers. I will now give short accounts of those cases in the town which were attended by myself or my assistant. Most of these were amongst persons living in squalid, unventilated habitations. Many were moribund before they were seen; and nearly all were imperfectly nursed. The chlorine treatment was commenced at the beginning of the visitation of cholera, when the disease was in its worst form. Had the good effects of chlorine been manifested only in the later period of the epidemic, I should have felt more doubtful as to its remedial power.

The following cases are given in the order in which they occurred. That of Alderman Trevor is not included in the list.

1. A. D., girl, aged 9. Cramps; vomiting. Rice-water evacuations; died in three days. The mother of this child was seized a few days later, and died. Treated by acids.

2. R. W., a middle-aged labourer. Moribund. Died in two hours after being seen.

3. J. W., a mechanic, aged 45; of dissipated habits. Rice-water diarrhoea and violent vomiting. In two hours was in a state of collapse. Sulphuric acid was tried in this case without any good effect. Chloroform relieved the cramps. He was taken to the Cholera Hospital, and died about ten hours after seizure.

4. J. A., aged 55. Rather delicate-looking. His eldest son lying dead in the house without having been seen by any medical man. Nervous depression very great; sank in eight or ten hours. Calomel, with small doses of opium; chloroform frictions, etc. He had been a great drinker.

5. J. A., aged 56, wife of the above. Same symptoms; sank in eighteen hours. Treatment the same.

6. M. J., aged 25. Recently confined; treated by acids. Was removed to the Cholera Hospital, where she sank in a few hours.

In the following cases, chlorine was tried; in some of them the collapse was so intense as to render any plan of treatment next to hopeless:—

1. J. H., boy of 5. When first seen, had been purging and vomiting from the previous day. The skin blue; eyes sunken, more than half open, and turned upwards. Pulse could not be felt, and I was told that he had been frequently convulsed. A teaspoonful of the chlorine mixture was administered in an hour after I first saw him, and afterwards given regularly. Warm flannels were applied to the surface, and iced milk and water and chicken-tea were given. I called in a few hours hardly expecting to find him alive. Warmth, however, was restored to the surface, and the pulse was distinctly perceptible at the wrist. His colour was not so blue, and he was able to swallow. It would be tedious to relate the whole particulars of this case; suffice to say, that though he had repeated convulsions, he lingered on for three days, and died comatose. Had

it not been for the chlorine, I hardly think the little fellow could have lasted three hours after the time I first saw him.

2. R. H., a railway guard, was seized on his way to Holyhead, and brought back to Chester. He was carried to his own house, where I found him in a state of deep collapse. Chlorine was administered. He made no rally, and died in a few hours.

3. H. J., aged 55; labourer. When first seen, had been ill three or four hours. Vomiting and rice-water purging had been very severe. Everything was now passed into the bed. Eyes sunken, skin blue, and cramps intense. Mustard-plasters, warm flannels, friction, were assiduously employed, and the chlorine mixture, with ice and iced drinks, given regularly. Reaction set in, and in three days the evacuations were assuming a natural colour, and he was altogether going on well. He did not quite recover his strength for some weeks.

4. S. S., married woman, aged 45. In a low, damp, unventilated house. Violent cholera and cramps. She rallied under the use of chlorine, but afterwards sank. The nursing in this case was very bad. She steadily refused to be removed to the Cholera Hospital.

5. H. K., aged 60. Mechanic; of very dissipated habits. Had been suffering from diarrhœa for a week. Cholera had set in twenty-four hours before I saw him. I found him in a dying state. Chlorine was tried, but he did not rally, and died in six or eight hours.

6. A. R., aged 55. Steady man. Had been subject to diarrhœa. Took a dose of castor-oil on the morning of the day of seizure. Collapsed when first seen, and died in twelve hours. A few doses of chlorine were administered. Vomiting and purging did not occur after he was first seen. He had exposed himself to cold during the occurrence of the purging.

7. J. G., aged 35. A married woman. There was scarcely room to walk between the two beds, which nearly filled the whole of her wretched, ill ventilated bedroom. Chlorine was given with considerable benefit. She rallied, but afterwards sank. I attribute her death to inefficient nursing.

8. A. G., labourer; middle-aged. Rice-water purging, vomiting, and cramps. Improved on the second day under chlorine, and good nursing. Made a good recovery in about a week.

9. J. P., aged 27. Choleraic symptoms: cramps, purging, and great depression. Chlorine was given regularly for three days. He made an excellent recovery. Nursing was very good.

10. J. W., had been purged more than twenty times before he was seen. Quite blue, and dreadfully cramped. Felt that he was dying. Made a good recovery. The first dose of chlorine stopped the rice-water evacuations, and ice greatly relieved the sickness.

For the following memoranda as to the results of treatment in the Cholera Hospital, I am indebted to the notes of Miss Frances M. Wilbraham, who, with Miss Ayckbowm and Miss Barker, so kindly and skilfully nursed these poor sick people:—

Of the first 29 cases treated without chlorine, 21 died, and 8 recovered. After the 20th of October, the cases were all treated with chlorine: of these 6 recovered, and 2 died. Of the 8 recoveries without the use of chlorine, 5 had secondary fever, and 1 suffered from very severe head symptoms, continuing for several days. The following list contains only those patients treated by chlorine in the hospital:—

1. E. T., a girl, aged 9. Violent rice-water diarrhœa; thirst, cramps, and restlessness; took chlorine regularly, with ice after each dose. Recovered.

2. W. C., a boy, aged 5. Violent sickness; chlorine given frequently, seizing the moments when the stomach was quiet; no after-fever. Recovered.

3. T. C., a man, aged 27. Rice-water purging. Recovered, without consecutive fever.

4. E. H., a woman, aged 23. Lay neglected in the town for many hours after seizure. Had been half-starved. Brought in a dying state to the hospital. Chlorine seemed to rouse vitality for several hours. Died.

5. M. R., aged 60. Husband had died three days before. She did not rally under treatment. Died.

6. C. L. Had been confined ten days before her seizure. She had violent cramps, sickness, and rice-water purging. The thirst and restlessness were excessive. She several times appeared to be dying. Blueness and clamminess of the skin, sunken eyes, and great exhaustion. She was for some time picking at the bed-clothes. Chlorine was administered regularly from Sunday till Wednesday, when Mr Brittain recommended the dose should be given at longer intervals than usual. She had flushings and excitement, but no after-fever. Recovered.

7. E. W. Very weakly woman. Chlorine seemed to revive and warm her. Recovered without subsequent fever.

8. E. R., an intemperate elderly woman, very weak. Recovered.

Miss F. M. Wilbraham observes, "We steadily refused to let the patients drink anything for full ten minutes after each dose, as drinking instantaneously produced sickness. We thought that this medicine decidedly checked the secondary fever."

Including the case of Alderman Trevor, and taking into account that two of the cases in my first list died in the Cholera Hospital, it appears that of 34 cases of cholera in the town and in the Hospital, treated on the ordinary plans, 8 recovered, and 26 died; and of 18 treated by chlorine, 10 recovered, and 8 died. If this result of the observation of 52 cases of cholera be of any value, it shows a striking advantage in the mode of treatment by means of chlorine.

I may here observe that the chlorinated mixture is apt to be imperfectly prepared by the druggists. When the chlorate of potash is dissolved in a considerable quantity of water, and the pure hydrochloric acid added, scarcely any chlorine is set free.

If prepared in the following way, the result is very satisfactory :—

Take a clear dry wine or brandy bottle, place it for a few minutes upon a hot brick, or upon a stove, until it becomes thoroughly warm, then take eight grains of chlorate of potash in coarse powder, and add to it one fluid drachm, by measure, of chemically pure hydrochloric acid; agitate the chlorate in the acid until all effervescence ceases, and the chlorate is completely dissolved. Then add an ounce of water, shaking the bottle briskly. Continue thus to add sixteen ounces of water, ounce by ounce, shaking the bottle between each addition. If two fluid drachms of chloric ether be now added, the mixture is complete.

To this mixture I should be much inclined to add a moderate dose of the liquor morphiae hydrochloratis, following out a suggestion of Dr Alderson, of which I shall say a few words presently.

The chlorine mixture, as thus prepared, is about one-third saturated with chlorine, it can be readily taken by patients direct from the bottle; but it was generally administered with an equal bulk of water. Three drachms of the mixture are about equal in strength to a drachm of the liquor chlori of the British Pharmacopœia.

The dose of the chlorinated mixture was half-an-ounce every hour, or every two hours, to an adult; if the first dose was vomited, another was given after a shorter interval.

Mr Brittain chiefly used the liquor chlori of the British Pharmacopœia in drachm doses, diluted with a tablespoonful of water.

In the very numerous cases of severe choleraic diarrhoea which occurred in Chester during the prevalence of the epidemic, no remedy appeared to me at all equal to the chlorine mixture. Many patients, grateful for the speedy relief, spontaneously said, "That is a wonderful medicine—I was better after the first dose." There cannot be a doubt that many of these cases would have passed into true cholera had the disease not been checked in the early stage. This leads me to remark, that in houses where cholera had broken out, I generally ordered the whole family to take a teaspoonful of the chlorine mixture two or three times a-day, and in no case, when this plan was adopted in addition to thorough ventilation and disinfection, did the cholera extend to other members of the household.¹

Chlorine seems to have a decided effect in restraining the excessive exudation from the mucous membrane of the bowels. The slight acidity of the mixture probably adds to its usefulness, as it has been demonstrated that the osmotic current travels from the acid to the alkaline side of a membrane. The chlorine renders the retained secretions innocuous, and may possibly exert a special action on the blood itself if the osmotic current be reversed, even supposing that all active absorption from the bowels be in abeyance.

¹ Mr Shepherd, chemist, of this city, tells me that the late Dr Sawyer of Guildford Street, London, fourteen years ago, was in the habit of ordering chlorine in cases of choleraic diarrhoea.

Dr Alderson, in a very interesting lecture, recently published in the *Lancet*, has called attention to the fact discovered by Poiseuille, that the hydrochlorate of morphia has a remarkable power in checking osmotic action. He goes on to observe,—“It was ascertained by him that when that substance was added to saline solutions the osmotic action tested between them and serum is immediately affected. The current is at first stayed, and after a time is actually reversed. This was confirmed by Bacchati, and it at once reveals the mode of action of morphia in checking diarrhœa, and in promoting constipation.” Further on in the lecture, Dr Alderson remarks,—“Checking the flow of albuminous fluid from the bowels, on the principles displayed by Poiseuille and Bacchati, has reason in it; and I should advise for that purpose the use of morphia in the form of hydrochlorate; the hydrochlorate having shown a specific power not only to stay the current, but to reverse it.”

I should therefore be strongly inclined, in the future treatment of cholera, to add moderate doses of the hydrochlorate of morphia to the chlorine mixture during the continuance of the diarrhœa, and after its cessation, or when collapse had fairly set in, to give the chlorine mixture alone. I noticed that the chlorine mixture had a remarkably sedative action upon the stomach and bowels; the vomiting as well as the diarrhœa being restrained. My impression is, that the chlorine mixture, with the addition of chloric ether, was better tolerated by the irritable stomach than the diluted chlorine water given alone.

The pulse, in cases where it was quite imperceptible at the wrist, became in a short time full and strong. The capillary circulation being restored, the surface became warm, and the purplish blue of the skin changed to a more natural hue. The cramps were subsequently less severe. Reaction was seldom violent, and I do not recollect one instance of secondary fever in the cases treated by chlorine.

The secretions of the liver and kidneys in mild cases were rapidly restored. Another point to be observed is the remarkable comfort it gave to the patients; the excessive restlessness was much mitigated, and one man said, “I could not live without that medicine.”

The object of this communication will be gained if the attention of my medical brethren be directed to this remedy, already so useful in bad cases of scarlatina. I feel that its true value in cholera can only be properly tested by trial on a large scale. So many new remedies have been proposed and found worthless that nothing short of the conviction that chlorine will prove valuable in combating this dire malady, could have overcome my reluctance to add another to the long list of anti-choleraic medicines.